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E-WAVE ASSOCIATED VORTEX FORMATION FACILITATES DIASTATIC MITRAL LEAFLET COAPTATION

ACC Poster Contributions
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Session Title: Tisue Doppler, Speckle Tracking and Diastolic Function
Abstract Category: 31. General Echocardiography: TTE
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Background: Coaptation of mitral leaflets during diastasis depends on ventricular compliance, and on multiple other mechanisms including vortex ring formation. During the E-wave, the (toroidal) vortex ring grows behind the leaflets and at diastasis coapts them. Hence vortex ring growth, measured by vortex formation time (VFT), provides a mechanism-based measure of leaflet closing velocity (CV). VFT is a known diastolic function (DF) correlate. We hypothesized that VFT is related to CV (M-mode, E to F slope).

Methods: 12 datasets (average age 56, 6 men) with normal LVEF, normal coronary anatomy and normal valve function were selected from our simultaneous echocardiography-high fidelity (MILLAR) catheterization database. VFT was calculated using established methods. CV was determined from M-mode via a custom MATLAB program. For each dataset an average of 27 cardiac cycles were analyzed (total 322 cycles) to generate averaged VFT values and CVs for each subject.

Results: In accordance with the hypothesis, the linear correlation between VFT vs. CV was significant (R2 = 0.55, slope = -0.02). VFT vs. CV are linearly correlated. The negative slope indicates that as VFT increases (worsening DF) closing velocity decreases.

Conclusions: Efficient vortex formation facilitates normal leaflet coaptation at mid-diastole (diastasis) and is a DF correlate.